



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/700,635

11/05/2003

Kazunori Mune

Q78224

4858

23373

7590

10/14/2005

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

PENG, CHARLIE YU

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/700,635

Applicant(s)

MUNE ET AL.

Examiner

Charlie Peng

Art Unit

2883

pm

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9 and 10 is/are allowed.
- 6) ☒ Claim(s) 1-8, 11 and 12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 11, and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,855,478 to DeVoe et al. in view of U.S. Patent 6,132,930 to Hayashi et al.

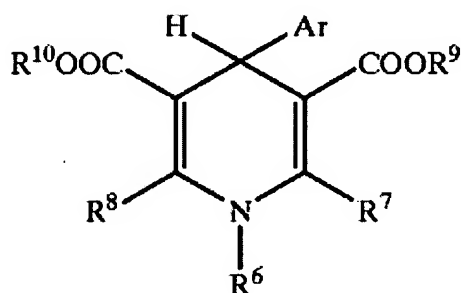
DeVoe teaches a method of microfabrication in which a laser is illuminated (irradiated) upon a photodefinable composition, and a focal point of the laser is moved in a three-dimensional manner within the photodefinable composition by means of X-Y-Z servo-feedback-controlled translation stages to create a pattern of inter-connected waveguides (cores) 26. (See at least **Column 16 / Example 1**) The photodefinable composition is coated as a film onto a silicon wafer substrate prior to patterning by the laser. DeVoe further teaches the film can be further cured by heating while maintaining the waveguide structure and performance. DeVoe still further teaches that the laser can have a pulse width of less than 200 femtoseconds (or 200×10^{-15} seconds) and has an average power of up to 1400mw. It is noted that the word "imidize" has no specially meaning defined by the applicant in the Specification or to one having ordinary skill in the art. For the purpose of this prosecution, it is the Examiner's understanding, through

Art Unit: 2883

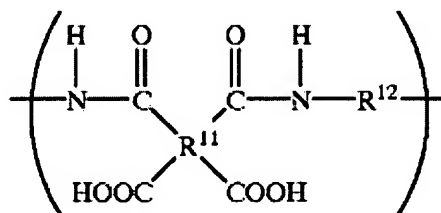
the interpretation of the Specification that "imidize" means to cure or to polymerize a polyamic material (for it to become a polyimide).

DeVoe does not teach the photodefinable composition film is polyamic acid obtained from tetracarboxylic dianhydride, a diamine, and a 1, 4-dihydropyridine derivative.

Hayashi teaches a negative photoresist composition comprising a polyamic acid and a 1, 4-dihydropyridine derivative represented by the general **formula (2)**:



wherein Ar represents an aromatic group having a nitro group in an orthogonal position, R^6 represents an alkyl group having 1 to 5 (*a range that includes 1-3*) carbon atoms, and R^7 , R^8 , R^9 , and R^{10} each independently represents a hydrogen atom or an alkyl group having 1 to 4 (*a range that includes 1-2*) carbon atoms. (See **Column 2, lines 28-64**) The polyamic acid represented by a general formula (5):



which can be obtained by reacting a carboxylic dianhydride having a tetravalent skeleton such as diphenylhexafluoropropane (R^{11}) with a diamine having bivalent skeleton such as diphenylhexafluoropropane (R^{12}). Hayashi further teaches that preferred among the 1,4-dihydropyridine derivatives represented by general **formula (2)** given above is 1-ethyl-3,5-dimethoxycarbonyl-4-(2-nitrophenyl)-1,4-dihydropyridine (**formula (4), column 3, lines 19-30**). Hayashi still further teaches that the 1,4-dihydropyridine derivative represented by general **formula (2)** is incorporated in such amounts that the sum thereof is generally from 5 to 50 parts by weight per 100 parts by weight of the polyamic acid. Hayashi still further teaches that the photoresist composition can be irradiated to conduct exposure to obtain a desired pattern, and then heated to a high temperature to imidize the polyamic acid.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the photoresist composition by Hayashi for the photodefinable composition by DeVoe in the method of microfabrication. The motivation would be to take advantage of the many excellent qualities of the photoresist composition by Hayashi such as sensitivity, resolution, adherability, etc.

Reasons for Allowance

Claim 9 is allowed. DeVoe and Hayashi teach the process of producing the optical waveguide using a laser beam on a polyamic film except for the particular repeating frequency of the pulse laser. There is no obvious motivation to one having ordinary skill in the art at the time the invention was made to combine other prior art to meet the claims. It is the examiner's opinion that the prior art of record, taken alone or

in combination, fails to disclose or render obvious in combination with the rest of the limitations of the base claim.

Claim 10 is allowed as it is dependent upon the allowed claim 9.

Response to Arguments

Applicant's arguments filed 14 July 2005 have been fully considered but they are not persuasive.

1. Applicant argues that DeVoe does not teach a step of the claimed method where heating and subsequently polymerization of the polyamic acid occurs. DeVoe teaches a method of forming a waveguide having a core and a cladding from a photo-hardenable (light curable) composition having at least one photosensitizer. Hayashi teaches a photoresist composition that incorporates photosensitizers into a polyamic acid. Contrary to the applicant's statement, DeVoe teaches that, optionally, the film can be further cured by heating to complete the formation of a waveguide, and with the formation of the waveguide, it is inherent that the refractive index of the core differs from that of the cladding. (See column 16, lines 57 to 60)

2. Applicant apparently also argues that DeVoe teaches curing of composition during irradiation and the instant application only teaches forming a core precursor during irradiation. However, since the claim language does not explicitly preclude curing in the irradiation step, this argument is not considered relevant. Furthermore, Hayashi teaches a method of using the photoresist composition where the photoresist is irradiated first to form a negative pattern, and the negative pattern is then heated to

Art Unit: 2883

300°C to imidize the polyamic acid. (See at least column 7, lines 28-45) This method is consistent with the concept of the instant applicant with regard to this argument.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charlie Peng whose telephone number is (571) 272-2177. The examiner can normally be reached on 9 am - 6 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2883

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charlie Peng
October 8, 2005



Brian Healy
Primary Examiner